

**Fisheries and Water Quality Enhancement Projects:
Eelgrass Restoration in San Francisco Bay**

Project Location

Two general locations include: China Basin to Candlestick Point in San Francisco, and in Berkeley from the marina to Golden Gate Field.

Project Relationship to Damages Caused by the Spill

The Cape Mohican oil spill impacted almost the entire City of San Francisco shoreline. Other shorelines in Alameda, Contra Costa and Marin counties and the open waters of the Central Bay also were impacted. Oil stranded on intertidal habitat and wharf pilings from Candlestick Point to the Golden Gate Bridge and on the coast from Pt. Reyes to Pacifica. Intertidal and aquatic organisms utilizing shoreline habitats were impacted, particularly Pacific herring which use the pier pilings and shallow subtidal rocky substrata as spawning habitat. Herring spawning habitats were coated with oil only weeks before spawning began. Because creosote pier pilings are toxic to herring eggs, this project will provide a natural substratum for herring to spawn on.

The creation of eelgrass beds in San Francisco Bay will provide additional herring spawning habitat and replace a portion of eggs and other ecological services that were reduced or lost as a result of the spill. This project would provide additional habitat and ecological services for an entire suite of species that use eelgrass beds as foraging, nursery, and nesting areas, such as fish, invertebrates and waterfowl.

Background

Pacific herring (*Clupea pallasii*) are an important ecological species as well as a valuable commercial and recreational resource. A large commercial fishery is supported in San Francisco Bay, particularly for roe that is exported to Japan. A smaller portion of the fishery relies on adult and juvenile herring that are caught and sold for bait or sold fresh or canned as food.

San Francisco and Tomales Bays attract the largest spawning aggregations of herring in California. The spawning in San Francisco generally begins in November and continues through March. Adult fish typically remain in deeper waters until spawning, where they move into nearshore shallow areas to lay their eggs on eelgrass, pier pilings, shell beds, and rocky structures. The size of the population has fluctuated through time, with the largest declines in biomass associated with *El niño* conditions.

Juvenile fish abundance may be correlated with recruitment to the adult spawning population two years later. Smaller young fish tend to be widely distributed in shallow habitats in South, Central and San Pablo Bays. As the young grow, they are found in deeper waters closer to the Golden Gate, and most emigrate from the bay between April and August.

In San Francisco Bay, the herring fishery has been managed by the CDFG since 1973, the beginning of the commercial fishery. Each year, the CDFG scientists monitor the number of fish returning to the bay, the amount and location of prominent spawns, the eelgrass beds, and develop an index of abundance for the young-of-year fish following hatching. As a result of this monitoring, the CDFG was able to demonstrate that the amount of San Francisco waterfront oiled during the spill represented 15 percent of the total waterfront habitat potentially used for spawning. This translated to an impact of just over two percent of the total spawning habitat bay-wide and eight percent of the total eggs estimated to have been spawned in the bay.

The creation of eelgrass beds in San Francisco Bay has far reaching benefits for a number of aquatic and avian species, as well as improved water quality.

Eelgrass beds are known to be productive habitats within the estuarine ecosystem. They provide habitat for many species of invertebrates, fish, and birds. They serve as refuge and nursery areas, foraging areas, and provide structural habitat for epiphytic and obligate organisms. Any additional eelgrass beds created by this project would provide more habitat for herring to spawn on, thereby potentially increasing the annual egg biomass, survivorship and possibly increased adult abundance.

Project Description

At each of two locations within the bay, three one-acre eelgrass (*Zostera marina*) beds will be planted. The sites generally include: the San Francisco waterfront from China Basin to Candlestick Park, and in the Berkeley area from the marina to Golden Gate Fields. At the San Francisco location three separate beds will be planted in shallow coves or basins with little boat traffic. Preliminary investigations suggest the South Basin at Candlestick Point State Park, India Basin and the Central Basin/Mission Rock area. Suitable conditions exist in these areas and herring spawn among the nearby pilings year after year. At the Berkeley site the three beds will be placed close together, separated by less than 200 feet to give the effect of one large bed. An exact location has not yet been selected.

All plants will be propagated from bay area beds by the contractor. Plantings will occur within a single year. Monitoring will include eelgrass and bed growth, an annual assessment of herring spawn and survivorship of eggs on eelgrass. This proposal currently identifies and budgets for the California Department of Fish and Game Herring Project biologists to perform part, if not all of the monitoring.

Project Cost

Planning/Project Management -	\$ 7,000
Site Preparation - (\$10,000 per acre x 6)	\$ 60,000
Planting (collection, propagation, out planting \$40,000 per acre x 6)	\$240,000
Monitoring - (over five years, \$10,000 per year)	\$ 50,000
10% Contingency -	\$ 35,700
TOTAL	\$392,700

**Fisheries and Water Quality Enhancement Projects:
Pacific Herring Spawning Habitat Enhancement in San Francisco Bay**

Project Location

Several piers along the San Francisco waterfront have been identified. In consultation with the Port of San Francisco, the California Department of Fish and Game (CDFG) has chosen a project location in an area of known herring spawning and with mutual benefit to the Port and commercial herring fishermen. The the Port of San Francisco places the highest priority for piling replacement at Pier 92.

Project Relationship to Damages Caused by the Spill

The Cape Mohican oil spill impacted almost the entire City of San Francisco shoreline as well as many other areas in the Central Bay. Oil stranded on intertidal habitat and wharf pilings from Candlestick Point to the Golden Gate Bridge and on the coast from Baker Beach to Ocean Beach and further south. The entire community of middle to upper intertidal and aquatic organisms utilizing rocky shoreline and pier piling habitats were impacted, particularly Pacific herring which use the pier pilings and shallow rocky substrata as spawning habitat. Herring spawning habitat was coated with oil only weeks before spawning began.

Creosote pier pilings are common along the waterfront. Studies have shown that creosote, a petroleum compound, is toxic to eggs and larvae of herring and other aquatic species. This project will replace existing creosote covered pilings by wrapping them with a heavy plastic sheathing or replacement with cheminite-treated wood piles. This project will provide a clean and non-toxic surface for herring to spawn on and for encrusting invertebrates to grow, thereby enhancing ecological services for the entire pier piling community.

Background

Pacific herring (*Clupea pallasii*) are an important ecological species as well as a valuable commercial and recreational resource. A large commercial fishery is supported in San Francisco Bay, particularly for roe that is exported to Japan. A smaller portion of the fishery relies on adult and juvenile herring that are caught and sold for bait or sold fresh or canned as food.

San Francisco and Tomales Bays attract the largest spawning aggregations of herring in California. The spawning in San Francisco generally begins in November and continues through March. Adult fish typically remain in deeper waters until spawning, where they move into nearshore shallow areas to lay their eggs on eelgrass, pier pilings, shell beds, and rocky structures. The size of the population has fluctuated through time, with the largest declines in biomass associated with *El niño* conditions.

Juvenile fish abundance may be correlated with recruitment to the adult spawning population two years later. Smaller young fish tend to be widely distributed in shallow habitats in South, Central and San Pablo Bays. As the young grow, they are found in deeper waters closer to the Golden Gate, and most emigrate from the bay between April and August.

In San Francisco Bay, the herring fishery has been managed by the CDFG since 1973, the beginning of the commercial fishery. Each year, the CDFG scientists monitor the number of fish returning to the bay, the amount and location of prominent spawns, the eelgrass beds, and develop an index of abundance for the young-of-year fish following hatching. As a result of this monitoring, the CDFG was able to demonstrate that the amount of San Francisco waterfront oiled during the spill represented 15 percent of the total waterfront habitat

potentially used for spawning. This translated to an impact of just over two percent of the total spawning habitat bay-wide and eight percent of the total eggs estimated to have been spawned in the bay.

By providing a non-toxic surface for herring to spawn on, the survivorship of eggs and larvae is likely to be greater in the project area than in areas of creosote coated pilings. Although the Port of San Francisco stopped installing new creosote-treated piles in 1995, hundreds of creosote piles remain on Port property. Many have been wrapped with heavy plastic sheathing, primarily to protect the piles from boring organisms, but also functions to reduce leeching and the extent of contact with bay water. Many others are destined for removal as part of major renovation or demolition projects, and therefore are not good candidates for immediate replacement.

Cheminite-treated wood piles are currently the Port's preferred alternative to creosote piles and are approved by the Regional Water Quality Control Board and the Department of Fish and Game as suitable alternatives to creosote piles. Cheminite-treated piles are pressure treated wood containing a copper compound. The Port has already identified certain pile replacement projects which are necessary for maintenance and repair of existing facilities and would replace creosote piles with cheminite piles; however funds are not currently available to implement many pile replacement projects.

The replacement of creosote piles with cheminite-treated piles and/or wrapping existing or new piles will serve to improve water quality and benefit herring. Other aquatic species such as mussels, anemones, sponges, barnacles, worms and a host of other pilings dwelling species also will benefit from non-toxic pilings.

Project Description

This project will involve the replacement and wrapping of creosote-covered pier pilings in the Port of San Francisco. In collaboration with the Port of San Francisco, a couple of project alternatives have been identified for consideration. The Port has identified many pile replacement projects where funds from this Trust could be spent to benefit the environment and the Port.

#1 Pile replacement at Pier 92 is a high-priority, but currently unfunded project. This project would replace 90 65-foot creosote piles with cheminite piles. The cheminite piles could also be wrapped with plastic sheathing, an option that would provide greater protection but would increase costs (see option 1a in budget).

#2 With heavy plastic sheathing, wrap and encapsulate existing creosote piles at several locations throughout the Port.

Construction funded by the Trust would be performed by the Port. Planning, permitting and environmental compliance would also be completed by the Port at no cost to the Trustees.

Project monitoring would evaluate the use of the new piles by herring for spawning and the settlement of other encrusting organisms. Monitoring would also examine the survivorship of herring eggs on wrapped, cheminite and creosote pilings. Monitoring would continue for five years or until the piling community has established itself comparable to undisturbed piles and herring use is documented.

Project Cost

Construction/Materials/Equipment/Labor -	
Option #1- Pier 92 Cheminite Piles	\$226,300
Option #1a - Wrapping Cheminite piles at Pier 92	\$ 36,000
Option #2 - Wrap Creosote piles	
(\$250-\$400 per piling, number of piles is 860 - 1380)	\$215,000 to

	\$552,000
Monitoring - (5 years)	\$ 80,000
TOTAL Option #1	\$306,300
#1a	\$342,300
#2	\$120,000 to
	\$425,000

**Fisheries and Water Quality Enhancement:
Wetland Enhancement and Delineation at Pier 94, San Francisco**

Project Location

A small tidal salt marsh (3-4 acres) along the northern and eastern shore of Pier 94 in San Francisco.

Relationship to Damages Caused by the Spill

The Cape Mohican oil spill impacted almost the entire City of San Francisco shoreline as well as many other areas in the Central bay. Oil stranded on intertidal habitat and wharf pilings in the Port of San Francisco, the central bay islands and on the coast from Pt. Reyes to Pacifica. Many habitat types and organisms were impacted including wetlands, mudflats, sandy and rocky shores, pier pilings and open water. The salt marsh and fringing gravel beach at Pier 94 were oiled during the spill. Oil cleanup and removal of some sediments occurred. This wetland restoration project ties to many aspects of the Cape Mohican NRDA. It will provide direct in-kind compensation and services for impacted wetlands and mudflats within the spill area; it will provide spawning and nursery habitat for many fishes; it will provide habitat for foraging and roosting habitat for shorebirds, wading birds, waterfowl, passerines and raptors; and finally it will improve water quality of the bay by trapping sediments from runoff and turbidity, filtering metals and other waterborne contaminants, and provide another source of primary productivity, organic carbon and nutrients to the bay ecosystem.

This small wetland is an extremely valuable resource in a very industrialized portion of the bay. The pickleweed marsh and mudflats offer foraging and roosting habitat to several species of birds and other wildlife. The wetland is backed by a dense coyote bush upland plant community (approx. 2 acres) serving passerine birds and small mammals. However, about a third of this wetland has been filled with concrete, asphalt, and tires. Upon removal of the debris and the fencing of the entire wetland and upland habitats, the wetland has good potential for natural recovery.

Background

A small area of tidal salt marsh (three to four acres) has developed along the northern and eastern shore of the Port's Pier 94. There are existing industrial uses adjacent to the marsh which have potential to impact the wetlands, and the Port is currently planning for extensive leasing and development of the upland portion of Pier 94 for various industrial uses. Delineation of the wetlands and installation of a low fence marking the salt marsh and upland areas would be an important step toward protecting the marsh in this area from encroaching industrial neighbors.

The existing marsh offers some habitat value for fish and wildlife, although habitat quality could be greatly increased by removing debris (tires, asphalt, metal) and enhancing tidal flow through the marsh. The potential for restoration is good because of a healthy stand of existing marsh vegetation, its isolated location, and little disturbance from the public.

Project Description

The project will consist of three phases. Phase I: A delineation of the wetland and upland areas and a hydrology assessment. Phase II: Debris removal (100's of yards of concrete, asphalt, tires, and metal) from the wetland and tidal flow enhancement. Phase III: Construction of a low post-and-cable fence to mark the area and prevent neighboring industrial uses from encroaching on the site.

Project Cost

Wetlands Delineation, Hydrology Assessment, Construction Planning & Specs	\$ 15,000
Marker Fence	\$ 10,000
Debris Removal	\$282,000
TOTAL	\$307,000

**Fisheries and Water Quality Enhancement Projects:
Wetland Restoration at Pier 98, India Basin, San Francisco**

Project Location

Pier 98 is on the north side of India Basin, San Francisco. The restoration site is a 25 acre peninsula consisting of 8 acres of saltmarsh and 14 acres of scrub shrub upland.

Project Nexus and Scaling to the Injury

The Cape Mohican oil spill impacted almost the entire City of San Francisco shoreline as well as many other areas in the Central bay. Oil stranded on intertidal habitat and wharf pilings in the Port of San Francisco, the central bay islands and on the coast from Pt. Reyes to Pacifica. Many habitat types and organisms were impacted including wetlands, mudflats, sandy and rocky shores, pier pilings and open water. This project will seek to restore native salt marsh vegetation and eradicate exotic species. It will maintain and monitor the restoration efforts throughout the wetland and upland areas. This wetland restoration project ties to many aspects of the Cape Mohican NRDA. It will provide direct in-kind compensation and services for impacted wetlands and mudflats within the spill area; it will provide spawning and nursery habitat for many fishes; it will provide habitat for foraging and roosting habitat for shorebirds, wading birds, waterfowl, passerines and raptors; and finally it will improve water quality of the bay by trapping sediments from runoff and turbidity, filtering metals and other waterborne contaminants, and provide another source of primary productivity, organic carbon and nutrients to the bay ecosystem.

This peninsula has been a frequently used area by shorebirds, wading birds, waterfowl, and to the public as a good fishing location and natural area. Restoration of these wetland and upland habitats will increase the value of this resource and provide ecological services to wildlife and recreational opportunities to the public in an industrialized portion of the bay. The saltmarsh and mudflats will offer foraging and roosting habitat to several species of shorebirds, waterfowl and other wildlife. The wetland (8 ac.) will grade into native scrub shrub upland habitat (14 ac.) serving passerine birds and small mammals.

Background and Project Description

Pier 98 is a 25-acre peninsula comprised of artificial fill material that the Port of San Francisco had originally placed in the bay to support construction of maritime facilities. The construction was never completed, and over time tidal saltmarsh developed along the southern shore of the peninsula. Rather than remove this vast quantity of undeveloped fill, the Port has begun a separate project to create wetlands and a passive recreational public access area at Pier 98. Site improvements from the Port's project include enhancing the existing three acres of saltmarsh, creating five acres of new marsh, and providing public access improvements (landscaping, fishing and bird viewing areas) on the remaining upland area. Wetlands construction and the public access improvements are currently underway, funded by the City and County of San Francisco Public Utilities Commission, the Coastal Conservancy, and the Port.

Creation of new saltmarsh presents a unique opportunity to enhance native plant establishment in the transitional area between the high marsh and upland, which supports the greatest diversity of plant species found in tidal salt marshes. Some wetlands transition zone plants, such as salt marsh gumplant and marsh rosemary, will disperse readily into this newly created transition zone, but less abundant native species may not. This project proposes to propagate and plant several (13) less abundant transition zone species, such as *America maritima*, *Cordylanthys maritimus*, and *Suaeda californica* in the newly created transition zone. Successful revegetation

will require materials and labor for at least five years to promote establishment of the native transition zone species and remove exotics which will quickly dominate without aggressive weeding. This phase of the restoration project remains unfunded.

Revegetation efforts in the new wetlands and transition zone also offer a unique opportunity for local students and community members to participate in the wetland enhancement after the heavy earthwork is completed. Local community groups have demonstrated substantial interest in participating in ongoing stewardship of the site. This project proposes to work with local non-profit organizations such as the San Francisco League of Urban Gardeners (SLUG), and students from the community college to maintain and monitor the success of the revegetation effort. Aggressive removal of invasive species will be required for five years. Monitoring the success of the wetlands creation and revegetation efforts will continue for five years after construction is completed. Monitoring the site will provide valuable information about how the enhanced and created wetlands recover over time and indicate additional modifications that may be needed.

Project Cost

Transition Zone Revegetation	\$ 17,300
Maintenance: \$18,400/year x 5 years	\$ 92,000
Monitoring: \$29,000/year x 5 years	\$145,000
TOTAL	\$254,300

**Fisheries and Water Quality Enhancement Projects:
Steelhead Stream Habitat Enhancement at San Francisquito Creek**

Project Location

San Francisquito Creek, San Mateo and Santa Clara Counties

Relationship to Damages Caused by the Spill

The Cape Mohican oil spill impacted shorelines and surface waters throughout the central bay, the San Francisco shoreline south to Candlestick Point and many coastal beaches. Intertidal organisms, birds, and fish throughout the bay and coastal waters were affected. During the fall and winter months, several species immigrate into and through the bay to spawn. Pacific herring use pier pilings and shallow rocky substrata as spawning habitat. Anadromous fishes such as steelhead trout, chinook salmon, striped bass, and sturgeon spawn in the bay or its tributaries. Not far from the documented spill area, steelhead trout spawn in several south bay creeks, such as San Francisquito, Guadalupe, Coyote, and Alameda Creeks.

The project will rehabilitate spawning habitat of San Francisquito Creek used by steelhead trout. Enhancement efforts will involve three barrier removals, replanting of the native vegetation, and exotic plant removal. Many other species also will benefit from the ecological services provided by this creek enhancement. Birds, mammals, aquatic insects, and other fish will benefit from the project as a result of enhanced nesting, foraging and living areas.

Background

Steelhead trout are sea-run rainbow trout. They are an important ecological species as well as a valuable recreational resource. Once abundant throughout the San Francisco estuary and Delta, their abundance has declined due to human encroachment on spawning creeks, the placement of flood control structures and dams, pollution, channelization of creeks with concrete or being put underground, water diversions, and other reasons. The run at San Francisquito Creek is one of the best in the bay area and the best in South San Francisco Bay. This run has good potential for sustaining itself with habitat conservation and restoration efforts.

San Francisquito Creek restoration has strong support from the California Department of Fish and Game and the San Francisco Coordinated Resources Management Process, a non-profit group active in restoring the creek. With local community involvement and coordinated efforts with county and state agencies, this group is very effective at accomplishing a great amount of work with very little overhead costs.

Project Description

Immediate project needs are the removal of three barriers to the fish. Two are old concrete water diversion structures and the third is a dam. This would require most of the project funds. Other components of the project include the removal of exotic plants and the propagation and planting of native plants.

Project Cost

Barrier Removal:	\$15,000
Native Plant Propagation and Planting/Exotic Plant Removal:	<u>\$5,000</u>
TOTAL :	\$20,000

**Bird Restoration and Enhancement Projects:
Enhancement and Management of Red Rock Island**

Project Location

Red Rock is an 8-9 acre island located in San Francisco Bay approximately one-half km south of the Richmond-San Rafael Bridge at the intersection of San Francisco, Marin, and Contra Costa counties. Portions of the island are in all three counties.

Relationship to Damages Caused by the Spill

Oil from the Cape Mohican spill extended as far north in San Francisco Bay as the Richmond bridge and came within close proximity to Red Rock and other islands that support colonial nesting water birds that were present at the time. As a result double-crested cormorants, California brown pelicans, and western gulls were among the species of water birds that suffered the greatest losses in San Francisco Bay. This project would address impacts to these species by managing, and enhancing Red Rock for roosting and nesting waterbirds. It is reasonable to expect that within five years, with appropriate management and enhancement actions, 200 nests of the double-crested cormorant, a State listed species of special concern, could be established on Red Rock, along with an expansion of the existing western gull, black-crowned night heron and snowy egret colonies. The number of nests anticipated from the Red Rock acquisition and management project, as well as the increased availability of disturbance-free pelican roosting habitat, when accomplished in coordination with a coordinated central bay waterbird conservation program should replace the ecological services lost due to injuries to water birds caused by the Cape Mohican spill.

Background

Red Rock is the last remaining privately owned island in central San Francisco Bay. It is zoned for industrial use and is unprotected from human disturbance. The island is largely barren except for patches of grasses and coastal sage scrub vegetation. The island is currently utilized by a variety of terrestrial and waterbirds and has been recognized by the California Academy of Science and others as an important natural resource.

Double-crested cormorants nest nearby on the Richmond-San Rafael Bridge, and may historically have nested on Red Rock. Red Rock currently supports a significant western gull colony and a colony of black-crowned night herons and snowy egrets. The number of nesting pairs of snowy egrets has fluctuated during the 1990's from a low of 5 in 1992 to 80 in 1995. These fluctuations may have been due to disturbance and other factors at Red Rock and at the larger Marin Islands colonies. In addition to the nesting described above, California brown pelicans and other waterbird species roost on the island. With proper management, harbor seal haul-outs could be established on Red Rock.

Project Description

Through this project the island would be managed and enhanced for several species of nesting water birds utilizing strategies that have been employed successfully elsewhere in California. Restoration techniques would include the creation of nesting habitat through vegetation management, the construction of wood nesting platforms and the protection of the island from boaters and fishermen that currently cause human disturbance problems for nesting waterbirds. Social attraction techniques which have been used successfully to restore seabird colonies at several locations in the U.S., would be employed to attract and establish a double-crested cormorant colony on Red Rock. This would entail the use of decoys and recordings of courtship vocalizations among other techniques.

Project Cost

This project is currently viewed as a collaboration between a number of

agencies including The National Audubon Society, and one or more Bay Area Audubon Chapters. The land acquisition costs would be provided through other funding sources. \$200,000 would be required as a multi-year management fund to cover the costs of additional law enforcement, and educational outreach including signs, posters and pamphlets, and payments in lieu of taxes to local governments. Another \$500,000 would be utilized for habitat enhancement and the colony establishment (e.g., revegetation, social attraction equipment, nesting platforms, biologists salaries, etc.). \$100,000 would be utilized to coordinate this project with other waterbird conservation programs in the central bay including Yerba Buena, Alcatraz, Alameda Naval Air Station, the Marin Islands and Brooks Island.

Red Rock Management	\$150,000
Enhancement and Colony Establishment	\$500,000
Central Bay Waterbird Conservation	<u>\$150,000</u>
TOTAL	\$800,000

**Bird Restoration and Enhancement Projects:
Restoration of Injured Bird Species Through Native Vegetation Restoration
at Marin Islands National Wildlife Refuge**

Project Location

Marin Islands National Wildlife Refuge and State Ecological Reserve is located approximately one mile north of the Richmond-San Raphael Bridge immediately offshore of the town of San Raphael.

Relationship to Damages Caused by the Spill

Oil from the Cape Mohican spill extended as far north as the Richmond-San Raphael Bridge and came within close proximity to this site. A number of colonial nesting species including herons and egrets were affected by the spill.

Project Description

West Marin Island is the largest heron and egret rookery in San Francisco Bay, and also supports up to 40 nesting pairs of western gulls. The purpose of the project is to remove exotic vegetation (scotch broom, eucalyptus) and restore native vegetation on East Marin Island, and to enhance native vegetation on West Marin Island. The goal of this effort is to provide native nesting materials for the West Marin rookery, reduce nesting/roosting sites for avian predators, encourage the expansion of the rookery to East Marin Island, and to supplement nesting sites in the rookery. The effort includes the development of a management plan that will allow for the increased security/protection of the rookery during nesting season through appropriate signing, buoys, and cooperative agreements.

The Refuge will contract with the California Conservation Corps to remove broom and young eucalyptus by hand. Native species including California buckeye, coast live oak, California bay, California sagebrush and other coastal scrub will be replanted in cleared areas. Work would occur within the next non-nesting season (July 30 - February 1) following receipt of funds.

Project Cost

Planning, Environmental Compliance, Project Management	
(1 GS-7 Biotechnician for 1 year)	\$38,000
CCC contract (3 weeks @ \$6,000/wk)	\$18,000
Native plants	\$ 3,000
Logistical costs (boat use/gasoline/hand tools)	\$ 2,000
Monitoring (3 years follow-up)	<u>\$ 7,500</u>
Total	\$68,500

**Bird Restoration and Enhancement Projects:
Tern Habitat Enhancement at Alameda Point**

Project Location

Alameda Point, within the proposed boundaries of the Alameda National Wildlife Refuge, Alameda, CA

Relationship to Damages Caused by the Spill

The Cape Mohican oil spill caused injury and death to terns and gulls. This project would therefore mitigate in-kind for a species group damaged by the spill. The spill caused oiling in the Alameda area. Therefore, the project would also compensate for these projects on-site.

The California least tern colony at Alameda Point is the northernmost breeding colony along the California coast and the only substantial colony in San Francisco Bay. For the past 10 years, the colony has achieved high reproductive success and is growing in numbers of breeding pairs. In several years the colony size is likely to expand beyond the suitable nesting habitat currently available at the site.

Caspian terns also nest on Alameda Point. Number of breeding pairs at this colony has been decreasing in recent years, probably due to degrading habitat conditions. The open mudflat/sandy beach habitat that Caspian terns prefer for nesting is being encroached upon by vegetation. The project would recreate this open mudflat habitat, thereby also compensating for a habitat type lost in the spill (99 acres of mudflat/wetland were oiled by the spill).

Project Description

The project is composed of two components, which are independent of one another. The council could choose to fund either one or both of the projects described below:

A) California least tern nesting colony site expansion

The project would create additional nesting habitat to accommodate approximately 150 additional pairs of terns, thereby increasing the carrying capacity of this colony site by 60%. Current colony size is approximately 250 pairs. The current colony site of 4 acres would be enlarged to 6-8 acres. Suitable nesting substrate (gravel, oyster shell) would be added along the side of the existing site. The shape of the site would be altered from the current triangle to a rectangle or oval, thereby eliminating confining triangle corners. Drain tile and cinder blocks would be placed in the new site to provide shelter for chicks. The site would be fenced with a 3-4 foot tall electric fence to deter predators. Maintenance of the newly created habitat, consisting of weed-pulling and depositing additional pea gravel, would take place each year prior to tern arrival. This project could begin in year 2000.

B) Caspian Tern habitat restoration

The project would consist of creating and enhancing the existing Caspian Tern nesting site once the Navy completes hazardous waste clean-up of the site. Cleanup may not take place for another 5 years. A 5-6 acre site would be restored. Restoration would consist of contouring the area, removing invasive vegetation, and depositing suitable substrate to ensure the area is above water level when the site is opened to tidal action. Water control structures and channeling would be done to create a predator barrier.

Project Cost**A) California least tern nesting colony site expansion**

Fencing (1,200 feet @ \$10/ft)	\$ 12,000
Shell and pebbles (1,600 cu yds @ \$46/cu yd)	\$ 73,600
Environmental compliance & Project management	\$ 5,500
Monitoring (3 mos/yr for 3 yrs @ GS-5 rate)	\$ 20,000
Maintenance of habitat & fence (\$10,000/yr for 3 yrs)	<u>\$ 30,000</u>

TOTAL	\$141,000
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B) Caspian Tern habitat restoration

Materials/Equipment/Labor	\$ 65,000
Environmental compliance and project mgmt (3.5 mos @ GS-9 rate)	\$ 12,000
Monitoring (2.5 mos/yr for 3 yrs. @ GS-5 rate)	<u>\$ 16,500</u>

TOTAL	\$ 93,500
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TOTAL (Both Projects)	\$234,500
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**Bird Restoration and Enhancement Projects:
Enhancement of Shorebird Foraging Areas Through Control of Exotic Cordgrass
in San Francisco Bay Wetlands**

Project Location

Intertidal mudflat and saltmarsh areas in the San Francisco Bay Estuary.

Relationship to Damages Caused by the Spill

Mudflats and other wetlands in central San Francisco Bay were damaged by the 1996 Cape Mohican oil spill. Intertidal mudflat areas and tidal sloughs function as important foraging areas for 500,000 to 1,000,000 shorebirds which migrate through or winter in the San Francisco Bay area each year. In addition, wintering waterfowl and other waterbirds forage in the shallow intertidal areas. The project described below will restore intertidal habitat similar to that damaged in the spill, which will benefit shorebird, waterfowl, and other waterbird species throughout the Bay.

Project Description

This project involves eradication of the invasive exotic cordgrass (*Spartina alterniflora*) from mudflats and other intertidal areas in the San Francisco Bay Estuary. This exotic cordgrass was introduced into San Francisco Bay in the 1970's and has spread through the Bay over the past few decades. This plant species invades mudflats, suppresses marine infauna, competes with native salt marsh plants, excludes native fish, and hinders storm water management. It may also suppress native algae and eel grass.

Project Cost

Cost for hand spraying of Rodeo herbicide, which is the most effective treatment, is approximately \$1,000/acre. This includes labor, materials, access, and equipment costs. The project can be scaled based on these per acre costs. Three scenarios are presented below:

a) Large Project: Treatment Size = 150 acres

Materials/Equipment/Labor	
(150 ac @ \$1,000/ac)	\$150,000
Environmental compliance & project mgmt.	
(4 mos @ GS-11)	\$ 18,000
Monitoring	
(3 mos/yr for 3 yrs. @ GS-5 rate)	\$ 22,500
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	\$190,500

b) Medium Project: Treatment Size = 100 acres

Materials/Equipment/Labor	
(100 ac @ \$1,000/ac)	\$100,000
Environmental compliance & project mgmt.	
(3 mos @ GS-11)	\$ 13,500
Monitoring	
(2 mos/yr for 3 yrs. @ GS-5 rate)	\$ 15,000
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	\$128,500

c) Small Project: Treatment Size = 50 acres

Materials/Equipment/Labor	
(50 ac @ \$1,000/ac)	\$50,000
Environmental compliance & project mgmt.	
(2 mos @ GS-11)	\$ 9,000
Monitoring	
(1 mos/yr for 3 yrs. @ GS-5 rate)	\$ 7,500
	<hr/>
	\$66,500

**Projects to Compensate for Lost Use of State and National Parks:
Angel Island Foot Trail Enhancement**

Project Location

Angel Island is located in San Francisco Bay approximately one mile south-east of Tiburon in Marin County.

Relationship to Damages Caused by the Spill

Angel Island was one of the areas most heavily oiled by the *Cape Mohican* oil spill. All of the beaches on Angel Island were closed for several days because of the oil deposited on them during the spill. The public was denied access to these beaches until they were able to be cleaned up and declared safe. The project described below has a direct relationship to these damages, as it enhances the access to, and use of, the beaches that were closed because of the oil spill.

Project Description

This project would enhance the access to the beaches that were closed to public entry due to the oil spill. The public would gain safe and convenient access to several beaches on the island, as well as the use of a safe trail between a ferry dock and a beach. The following trail enhancements would be made within 12 to 18 months of receipt of funds:

- 1) The trail to Perle's Beach would be rebuilt and upgraded, including the replacement of a wooden stairway.
- 2) A walkway/stairway would be built at Quarry Beach to allow for safe and convenient access.
- 3) A walkway/stairway would be built at China Cove beach to allow for safe and convenient access.
- 4) The trail that connects the East Garrison dock to China Cove would be repaired.
- 5) The feasibility of a trail that would allow direct and easy access from the East Garrison dock to Quarry Beach will be evaluated. If feasible, the trail will be constructed.

Project Cost

Total cost for the project would be approximately \$180,000. All work would be done by contract. The cost breakdown would be approximately as follows:

- | | |
|---|-----------|
| 1) Planning and Environmental Compliance: | \$15,000 |
| 2) Construction: | \$150,000 |
| 3) Oversight: | \$15,000 |

**Projects to Compensate for Lost Use of State and National Parks:
Crissy Field Restoration, Maintenance and Public Access Fund**

Project Location

Crissy Field is a prominently located and heavily visited site at the entrance to San Francisco Bay. It lies entirely within the Golden Gate National Recreation Area and affords spectacular views of the Golden Gate, the Marin Headlands, Alcatraz, Angel Island and the San Francisco skyline.

Crissy Field is one of the preeminent shoreline access locations in the San Francisco Bay Area with current visitation approaching one million visitors annually. This number is expected to rise upon completion of the shoreline park improvements underway at the site.

Relationship to Damages Caused by the Spill

Crissy Field was the GGNRA site most heavily impacted by the October 1996 Cape Mohican oil spill. 7,000 linear feet of beach and associated shoreline dunes were heavily impacted. The spill restricted pedestrian access to the beach and halted boardsailing activity. In addition to adverse impacts on shorebirds and beach and dune ecosystems, the spill resulted in visitor use losses. Human use damages resulting from diminished quality of visits are approximately \$1,560,000.

Background

Crissy Field stretches over 1.5 miles of bay shoreline at the convergence of the San Francisco Bay Area's urban center and a vast natural expanse. Crissy Field is one of the area's most popular parks due to this singular setting and the spectacular vistas and shoreline access it offers. It is a destination for walkers, joggers and bicyclists and it is one of the premier boardsailing venues in the world. The site also provides an unparalleled educational resource.

A major enhancement project is now underway, sponsored by the Golden Gate National Parks Association and valued at approximately \$25 million. The project will restore tidal marsh, beach and dune habitats and improve public access and recreational opportunities. It will include comprehensive community-based education and stewardship programs that utilize the natural and historic features of Crissy Field.

Included in the overall plan for site restoration is a Community Environmental Center, which will conduct active community outreach and on-site education and recreation programs. These programs are designed to significantly enhance the participation and visitation of an increasingly broad spectrum of Bay Area communities and visitors. The location of the Center, at the edge of a restored tidal marsh and within a short walk of the restored shoreline dunes, will make it a community nexus and vital link for people to the Crissy Field site.

A significant portion of the donor-provided capital financing for the Crissy Field project is contingent upon the creation of a special fund that would adequately support ongoing maintenance, community stewardship and public access.

Project Description

The establishment of a Restoration, Maintenance and Public Access Fund for Crissy Field will support a comprehensive program which links public access, community outreach, education and stewardship. It will provide an ongoing

source of support for long-term restoration activities and maintenance of shoreline habitats.

As endorsed by the National Park Service, a contribution would be paid directly to and managed by the park's official non-profit partner, the Golden Gate National Parks Association, which currently manages several restricted funds for dedicated uses within the park. The focus of the Fund's expenditures would be the shoreline area that was adversely affected by the oil spill.

The Fund would promote extensive public involvement. It would allow the adoption at Crissy Field of a strong community-based restoration effort modeled on successful GGNRA volunteer stewardship programs. Through the Crissy Field Community Environmental Center, it will also support a variety of public programs engaging community members in aspects of Crissy Field's natural and human history. The Fund will leverage additional financial support and thousands of volunteer hours.

Specifically, the Fund would support, over five years, a restoration and public programs coordinator position; targeted internship positions supporting volunteer recruitment and coordination, monitoring and education; and associated school group transportation costs, outreach materials and restoration supplies. A significant part of the overall Fund will seed a maintenance and public access fund, which will leverage additional support and will support the ongoing protection of shoreline habitats and the maintenance of public access through a community stewardship program.

Project Cost

The Project cost includes a streamlined five-year program to establish a strong community-based restoration effort linking education and stewardship. A Maintenance and Public Access Fund would be seeded, leveraging additional support for ongoing maintenance and public access. Through this approach, the benefits of damage compensation to the affected site and the public would be vastly magnified. Depending on date of settlement, the portion of the settlement allocated to permanent maintenance and public access may be adjusted.

An \$850,000 contribution would help compensate the public for lost use of GGNRA areas during the closures resulting from the *Cape Mohican* oil spill.

	<u>Cost/Year</u>	<u>Yrs</u>	<u>Total</u>
RESTORATION & PUBLIC PROGRAMS			
Restoration & Public Programs Coordinator	\$50,000	5	\$250,000
Volunteer Coordination & Outreach Intern	\$14,000	5	\$70,000
Maintenance & Monitoring Intern	\$14,000	5	\$70,000
Education Intern	\$14,000	5	\$70,000
Outreach Support/Transportation	\$10,000	5	\$50,000
Materials/Printing/Media	\$5,000	5	\$25,000
Office Equipment & Supplies	\$2,000	5	\$10,000
RESTORATION & OUTREACH TOTAL			\$545,000
PERMANENT MAINTENANCE AND ACCESS			
Maintenance & Public Access Fund			\$305,000
TOTAL PROGRAM COST			\$850,000

Table 1. Summary of Available and Requested Funds by Category

Category	\$ Available Based on MOU	\$ Requested for Potential Projects
Wetland/Mudflat Habitat Restoration	\$400,000	\$350,000
Sandy/Rocky Beach Habitat Restoration	\$500,000	\$610,372
Fisheries and Water Quality Enhancement	\$425,000	\$1,242,500 to \$1,547,500
Bird Restoration and Enhancement	\$800,000	\$1,028,500 to \$1,293,500
Compensation for Lost Use of State and National Parks	\$1,030,000	\$1,030,000
Restoration Planning	\$470,000	\$470,000
TOTAL	\$3,625,000	\$4,731,372 to \$5,301,372

Table 2. Summary of Potential Restoration Projects for the Cape Mohican Oil Spill

Project	Resource Category	Estimated Cost	MOU Status*
Giacomini Coastal Wetlands Restoration	Wetland/Mudflats; Birds	\$300,000	Y
Entry-Triangle Marsh Restoration	Wetland/Mudflat	\$ 50,000	N
Sandy Beach Projects a) Exotic Plant Removal at PRNS	Sandy/Rocky Beach	\$226,872	Y
Sandy Beach Projects b) Ocean Beach Outreach	Sandy/Rocky Beach; Birds	\$23,500	Y
Intertidal Program at Duxbury Reef	Sandy/Rocky Beach	\$360,000	Y
Creation of Artificial Herring Spawning Habitat in San Francisco Bay	Fisheries/ Water Quality	\$148,500	N
Eelgrass Restoration in San Francisco Bay	Fisheries/Water Quality	\$392,700	Y
Herring Spawning Habitat Enhancement in San Francisco Bay	Fisheries/Water Quality	\$120,000 to \$425,000	N
Wetland Enhancement and Delineation at Pier 94	Fisheries/Water Quality; Wetland/Mudflat	\$307,000	N
Wetland Restoration at Pier 98	Fisheries/Water Quality; Wetland/Mudflat	\$254,300	N
Steelhead Stream Habitat Enhancement at San Francisquito Creek	Fisheries/Water Quality	\$20,000	N
Enhancement and Management of Red Rock	Birds	\$800,000	Y
Marin Islands Habitat Enhancement	Birds	\$68,500	N
Tern Habitat Enhancement at Alameda Pt	Birds	\$93,500 to \$234,500	N
Shorebird Habitat Enhancement in SF Bay	Birds; Wetland/Mudflat	\$66,500 to \$190,500	N
Angel Island Foot Trail Enhancement	Lost Use of State and National Parks	\$180,000	Y
Crissy Field Public Access and Enhancement Fund	Lost Use of State and National Parks	\$850,000	Y
TOTAL		\$4,261,372 to \$4,831,372	

* A 'Y' in this column means that the trustees relied on the project in developing the damage claim and have agreed in a Memorandum of Understanding to consider the project during development of the proposed Restoration Plan if the project is still feasible. A 'N' in this column means the project was not relied on by the trustees in developing the damage claim.